

Current set of claims:

1. (Currently Amended) A method for bonding a first substrate surface to a second substrate surface said first substrate surface being different than said second substrate surface, comprising:
  - (a) providing a catalyst at the first substrate surface said catalyst being diluted in a liquid carrier containing water;
  - (b) providing a metathesizable material between the first substrate surface and the second substrate surface or providing a metathesizable material as a component of the second substrate; and
  - (c) contacting the catalyst on the first substrate surface with the metathesizable material undergoes a metathesis reaction at normal ambient conditions without an external energy source and bonds the first substrate surface to the second substrate surface.
2. (Currently amended) A method according to claim 1 wherein ~~at least~~ one of the substrates comprises an elastomeric material.
3. (original) A method according to claim 2 wherein the elastomeric material is a thermoplastic elastomer.
4. (original) A method according to claim 1 wherein one of the first or second substrates comprises a metallic material and the other first or second substrate comprises an elastomeric material.
5. (original) A method according to claim 4 wherein the metallic material comprises steel and the elastomeric material is selected from natural rubber, polychloroprene, polybutadiene, polyisoprene, styrene-butadiene copolymer rubber, acrylonitrile-butadiene copolymer rubber, ethylene-propylene copolymer rubber, ethylene-propylene-diene terpolymer rubber, butyl rubber, brominated butyl rubber, alkylated chlorosulfonated polyethylene rubber, hydrogenated nitrile rubber, silicone rubber, fluorosilicone rubber, poly(n-

butyl acrylate), thermoplastic elastomer and mixtures thereof.

6. (withdrawn) A method according to claim 1 wherein the first substrate comprises a tire carcass and the second substrate comprises a tire tread.

7. (original) A method according to claim 1 wherein step (b) comprises applying the metathesizable material to the second substrate surface and step (c) comprises contacting the catalyst on the first substrate surface and the metathesizable material-applied second substrate surface.

8. (original) A method according to claim 1 wherein at least one of the substrates is substantially cured elastomeric material.

9. (original) A method according to claim 4 wherein the elastomeric material is substantially cured.

10. (canceled)

11. (original) A method according to claim 1 wherein steps (a)-(c) occur at room temperature.

12. (withdrawn) A method according to claim 6 wherein the bonding in step (c) occurs within one hour.

13. (original) A method according to claim 1 wherein step (a) comprises applying a catalyst onto the first substrate surface.

14. (original) A method according to claim 13 wherein the catalyst is dissolved or mixed into a liquid carrier fluid.

15. (original) A method according to claim 13 wherein the catalyst is included

as a component in a multi-component composition.

16. (original) A method according to claim 1 wherein the catalyst is included as a component of the first substrate.

17. (original) A method according to claim 7 wherein the metathesizable material is in the form of a liquid, paste or meltable solid.

18. (original) A method according to claim 7 wherein the metathesizable material is included as a component in a multi-component composition.

19. (Original) A method according to claim 1 wherein the metathesizable material is included as a component of the second substrate.

20. (Currently Amended) A method for bonding a metallic substrate surface to an elastomeric substrate surface comprising:

(a) applying a catalyst to the metallic substrate surface said catalyst being diluted in a liquid carrier containing water;

(b) applying a metathesizable material to the elastomeric substrate surface;  
and

(c) bringing the metallic substrate surface and the elastomeric substrate surface together to contact the catalyst and the metathesizable material and bonding said substrates together in a metathesis reaction at normal ambient conditions without an external energy source.

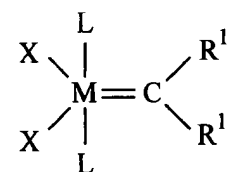
21. (original) A method according to claim 20 wherein step (c) occurs at room temperature.

22. (original) A method according to claim 20 wherein the elastomeric substrate is a substantially cured elastomeric material.

23. (original) A method according to claim 1 wherein the catalyst is selected from at least one of a rhenium compound, ruthenium compound, osmium compound, molybdenum compound, tungsten compound, titanium compound, niobium compound, iridium compound and  $\text{MgCl}_2$ .

24. (original) A method according to claim 23 wherein the catalyst is selected from a ruthenium compound, a molybdenum compound, iridium compound and an osmium compound.

25. (original) A method according to claim 24 wherein the catalyst has a structure represented by



wherein M is Os, Ru or Ir; each  $\text{R}^1$  is the same or different and is H, alkenyl, alkynyl, alkyl, aryl, alkaryl, aralkyl, carboxylate, alkoxy, alkenylalkoxy, alkenylaryl, alkynylalkoxy, aryloxy, alkoxycarbonyl, alkylthio, alkylsulfonyl or alkylsulfinyl; X is the same or different and is an anionic ligand group; and L is the same or different and is a neutral electron donor group.

26. (original) A method according to claim 25 wherein X is Cl, Br, I, F, CN, SCN, or  $\text{N}_3$ ; L is  $\text{Q}(\text{R}^2)_a$  wherein Q is P, As, Sb or N;  $\text{R}^2$  is H, cycloalkyl, alkyl, aryl, alkoxy, arylate or a heterocyclic ring; and a is 1, 2 or 3; M is Ru; and  $\text{R}^1$  is H, phenyl,  $-\text{CH}=\text{C}(\text{phenyl})_2$ ,  $-\text{CH}=\text{C}(\text{CH}_3)_2$  or  $-\text{C}(\text{CH}_3)_2(\text{phenyl})$ .

27. (original) A method according to claim 26 wherein the catalyst is a phosphine-substituted ruthenium carbene.

28. (original) A method according to claim 27 wherein the catalyst is

bis(tricyclohexylphosphine)benzylidene ruthenium (IV) dichloride.

29. (original) A method according to claim 1 wherein the catalyst is stable in the presence of moisture and oxygen and can initiate polymerization of the metathesizable material upon contact at room temperature.

30. (original) A method according to claim 1 wherein the metathesizable material includes at least one reactive unsaturated functional group.

31. (original) A method according to claim 30 wherein the metathesizable material comprises an olefin.

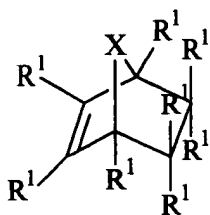
32. (original) A method according to claim 31 wherein the metathesizable material is selected from ethene,  $\alpha$ -alkene, acyclic alkene, acyclic diene, acetylene, cyclic alkene, cyclic polyene and mixtures thereof.

33. (original) A method according to claim 32 wherein the metathesizable material comprises a cycloolefin.

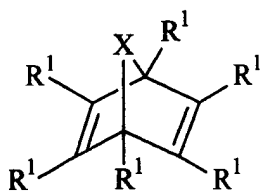
34. (original) A method according to claim 33 wherein the metathesizable material is a monomer or oligomer selected from norbornene, cycloalkene, cycloalkadiene, cycloalkatriene, cycloalkatetraene, aromatic-containing cycloolefin and mixtures thereof.

35. (original) A method according to claim 34 wherein the metathesizable material is a norbornene monomer or oligomer.

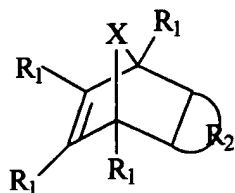
36. (original) A method according to claim 35 wherein the norbornene has a structure represented by



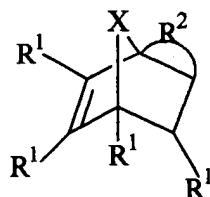
or



or



or



wherein X is  $\text{CH}_2$ ,  $\text{CHR}^3$ ,  $\text{C}(\text{R}^3)_2$ , O, S,  $\text{N-R}^3$ ,  $\text{P-R}^3$ ,  $\text{O=P-R}^3$ ,  $\text{Si}(\text{R}^3)_2$ ,  $\text{B-R}^3$  or  $\text{As-R}^3$ ; each  $\text{R}^1$  is independently H,  $\text{CH}_2$ , alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl, halogen, halogenated alkyl, halogenated alkenyl, alkoxy, oxyalkyl, carboxyl, carbonyl, amido, (meth)acrylate-containing group, anhydride-containing group, thioalkoxy, sulfoxide, nitro, hydroxy, keto, carbamato, sulfonyl, sulfinyl, carboxylate, silanyl, cyano or imido;  $\text{R}^2$  is a fused aromatic, aliphatic or heterocyclic or polycyclic ring; and  $\text{R}^3$  is alkyl,

alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl or alkoxy..

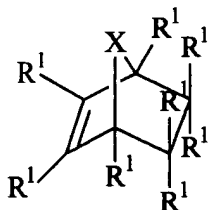
37. (original) A method according to claim 36 wherein the metathesizable material comprises ethylidenenorbornene monomer or oligomer.

38. (original) A method according to claim 1 wherein the metathesizable material comprises liquid ethylidenenorbornene monomer.

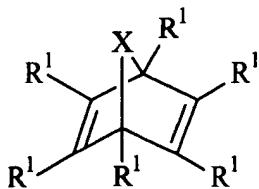
39. (original) A method according to claim 1 wherein the catalyst is applied in an aqueous solution or mixture and the metathesizable material is applied in the form of a liquid that is substantially 100 percent reactive.

40. (original) A method according to claim 1 wherein the method is substantially free of the use of volatile organic solvents.

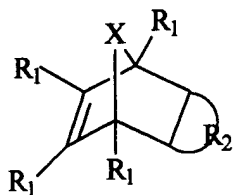
41. (original) A method according to claim 20 wherein the metathesizable material comprises norbornene monomer or oligomer having a structure represented by



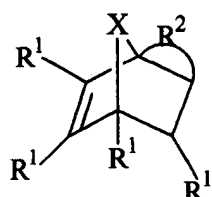
or



or



or



wherein X is  $\text{CH}_2$ ,  $\text{CHR}^3$ ,  $\text{C}(\text{R}^3)_2$ , O, S,  $\text{N-R}^3$ ,  $\text{P-R}^3$ ,  $\text{O=P-R}^3$ ,  $\text{Si}(\text{R}^3)_2$ ,  $\text{B-R}^3$  or  $\text{As-R}^3$ ; each  $\text{R}^1$  is independently H,  $\text{CH}_2$ , alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl, halogen, halogenated alkyl, halogenated alkenyl, alkoxy, oxyalkyl, carboxyl, carbonyl, amido, (meth)acrylate-containing group, anhydride-containing group, thioalkoxy, sulfoxide, nitro, hydroxy, keto, carbamato, sulfonyl, sulfinyl, carboxylate, silanyl, cyano or imido;  $\text{R}^2$  is a fused aromatic, aliphatic or heterocyclic or polycyclic ring; and  $\text{R}^3$  is alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl or alkoxy; and the catalyst is selected from a ruthenium compound, a molybdenum compound and an osmium compound.

42. (original) A method according to claim 41 wherein step (c) occurs at room temperature.

43. (original) A method according to claim 1 wherein step (a) comprises applying a ruthenium catalyst in a liquid carrier to the first substrate surface, step (b) comprises applying a metathesizable liquid norbornene monomer to the second substrate surface and step (c) comprises contacting the catalyst-



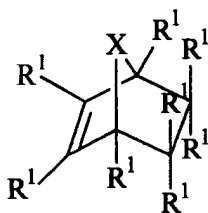
applied first substrate surface and the monomer-applied second substrate surface.

44 (Canceled)

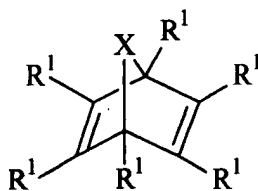
45. (Currently Amended) A method according to claim 44 99 wherein step (c) occurs at room temperature.

46. (Currently Amended) A method according to claim 44 99 wherein the tire tread comprises precured retread stock.

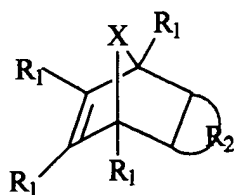
47. (Currently Amended) A method according to claim 44 99 wherein the metathesizable material comprises norbornene monomer or oligomer having a structure represented by



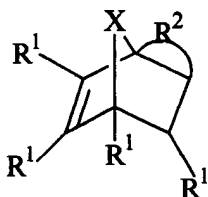
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or



wherein X is  $\text{CH}_2$ ,  $\text{CHR}^3$ ,  $\text{C}(\text{R}^3)_2$ , O, S,  $\text{N-R}^3$ ,  $\text{P-R}^3$ ,  $\text{O=P-R}^3$ ,  $\text{Si}(\text{R}^3)_2$ , B- $\text{R}^3$  or As- $\text{R}^3$ ; each  $\text{R}^1$  is independently H,  $\text{CH}_2$ , alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl, halogen, halogenated alkyl, halogenated alkenyl, alkoxy, oxyalkyl, carboxyl, carbonyl, amido, (meth)acrylate-containing group, anhydride-containing group, thioalkoxy, sulfoxide, nitro, hydroxy, keto, carbamato, sulfonyl, sulfinyl, carboxylate, silanyl, cyano or imido;  $\text{R}^2$  is a fused aromatic, aliphatic or heterocyclic or polycyclic ring; and  $\text{R}^3$  is alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, alkaryl, aralkyl or alkoxy; and the catalyst is selected from a ruthenium compound, a molybdenum compound and an osmium compound.

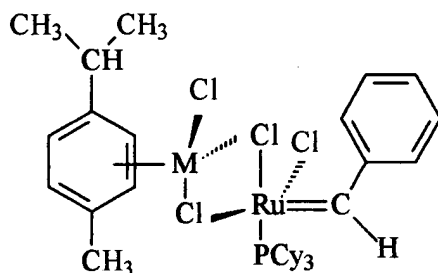
48. (Currently Amended) A method according to claim 44 99 wherein the catalyst is applied to the tire carcass and the metathesizable material is applied to the tire tread.

49. (Currently Amended) A method according to claim 13 wherein the catalyst is applied to said first substrate by way of applying said carrier and the carrier is dried so that it is said catalyst remains on the substrate surface in direct contact with the first substrate surface.

50 – 94. (previously canceled)

95. (original) A method according to claim 24 wherein the catalyst comprises

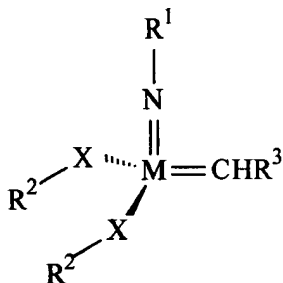
a bimetallic catalyst having a structure represented by



wherein M is Ru, Os or Rh.

96. (previously canceled)

97. (original) A method according to claim 24 wherein the catalyst has a structure represented by



wherein M is Mo or W; X is O or S; R<sup>1</sup> is an alkyl, aryl, aralkyl, alkaryl, haloalkyl, haloaryl, haloaralkyl, or a silicon-containing analog thereof; R<sup>2</sup> are each individually the same or different and are an alkyl, aryl, aralkyl, alkaryl, haloalkyl, haloaryl, haloaralkyl, or together form a heterocyclic or cycloalkyl ring; and R<sup>3</sup> is alkyl, aryl, aralkyl or alkaryl.

98. (previously canceled)

99. (withdrawn) The method according to claim 1 wherein said first substrate

is a tire tread, said second substrate is a tire carcass and said catalyst is applied to said tire tread or said tire carcass;

said metathesizable material is applied to the tire tread or tire carcass; and in (c) said tire tread and said tire carcass are brought into contact with each other and the metathesizable material undergoes a metathesis reaction to bond the tire tread to the tire carcass.